

SARS-CoV-2 Vaccine Breakthrough Surveillance and Case Information Resource

Washington State Department of Health

April 20, 2022



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COVID-19 vaccines are effective and critical tools to aid in the control of this pandemic. Large-scale clinical studies found that COVID-19 vaccines prevented most people from getting COVID-19 illness, but like most other vaccines, they are not 100% effective. This means some fully vaccinated people will still get infected with SARS-CoV-2. These individuals may or may not develop COVID-19 symptoms.

Vaccine breakthrough occurs when someone gets infected with an organism they are fully vaccinated against. For the COVID-19 vaccine, this means someone tests positive for SARS-CoV-2 two weeks or more after receiving the full series of an authorized COVID-19 vaccine. Since millions of people in the United States are getting vaccinated, we expect to see some breakthrough disease. Fortunately, there is evidence from research studies that the COVID-19 vaccine reduces the risk of people getting really sick and needing to go to the hospital or dying from COVID-19.

The Washington State Department of Health (DOH) is closely monitoring and investigating vaccine breakthrough cases in Washington to identify possible patterns of infection and disease in our population. The data in this report may change as we get additional information.

Methodology used to identify vaccine breakthrough cases

Beginning with the September 1, 2021 issue of this report, DOH started using a new method to help identify vaccine breakthrough cases. This methodology identifies cases by matching Washington Immunization Information Systems (IIS) data with new positive COVID tests to identify confirmed breakthrough cases. The criteria for a vaccine breakthrough case has not changed.

The method automatically verifies each case's vaccine doses and assures that at least 14 days has passed between the final vaccine administration date and the specimen collection date for the individual's positive test.

Previously, data was only obtained using reports from local public health and other interviewers who talked to people who had a positive PCR or antigen COVID-19 test and learned that the interviewee had been vaccinated. Both methods will be used to identify vaccine cases moving forward.

DOH has continued to review and incorporate methodologies on an ongoing basis to enhance its COVID-19 related data including for breakthrough surveillance. The goal is to ensure a more accurate account of the number of breakthrough cases in our state. Vaccines remain critical in providing protection against COVID-19 especially against severe illness and hospitalization.

Previously, our methodology allowed us to report only those people that tested positive 14 days or more after receiving the recommended primary COVID-19 vaccination series (2 doses of mRNA vaccines or 1 dose of J&J vaccine) as breakthrough cases. Beginning January 29, 2022, we modified our methodology to retrospectively include people who received doses of COVID-19 vaccine in addition to their primary series doses.

Vaccines remain critical in providing protection against COVID-19 especially against severe illness and hospitalization.

At a Glance (data from January 17, 2021 - April 09, 2022)

- 426,981 SARS-CoV-2 vaccine breakthrough cases have been identified in Washington State. Of these breakthrough cases:
 - 18% reported symptoms
 - 2% were hospitalized
 - 0.5% died of COVID-related illness

Criteria for SARS-CoV-2 vaccine breakthrough cases

The criteria for identifying vaccine breakthrough cases include a positive lab test (either a PCR test or an antigen test) at least 14 days after a person received their last recommended dose of an authorized COVID-19 vaccine.

We wait 14 days because some people could get COVID-19 soon after vaccination when their body hasn't had enough time yet to build full protection. These infections are not considered vaccine breakthrough cases because they could have been exposed before they were vaccinated. It typically takes about two weeks after the final dose of vaccine for the body to build a high level of protection against the disease.

The first COVID-19 vaccines were administered in Washington in mid-December 2020, so we started our surveillance for people who meet these case criteria during the week that began on Sunday, January 17, 2021.

From January 17 - April 09, 2022:

- 426,981 reports of possible breakthrough met the breakthrough case criteria

Note: The Washington State Department of Health continually receives and investigates reports of potential breakthrough cases. Therefore, the data in this report are subject to change as we obtain additional information on SARS-CoV-2 vaccine breakthrough cases.

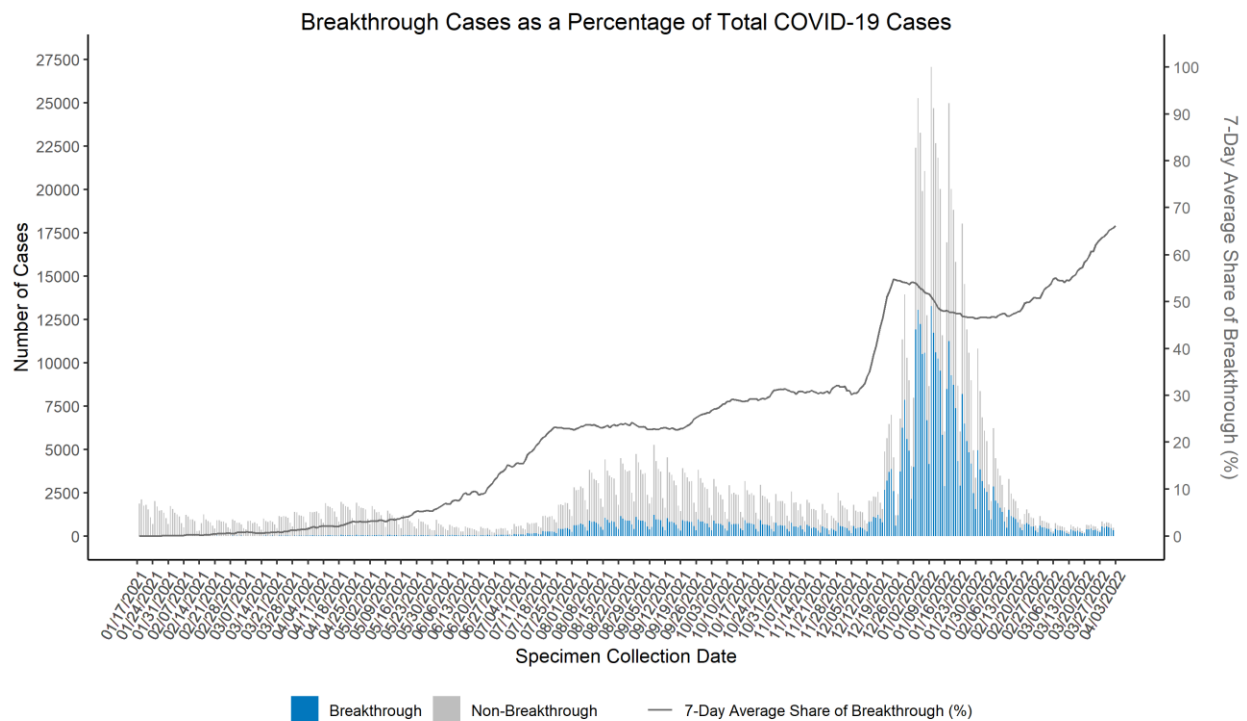
Washington State SARS-CoV-2 breakthrough and non-breakthrough cases by month

The epidemiologic curve below shows non-breakthrough COVID-19 cases (confirmed and probable) in grey and the number of breakthrough cases in blue by specimen collection date. The graph also shows the 7-day average of breakthrough as a percentage of overall COVID-19 cases.

Some factors that may have contributed to the increase in breakthrough cases include:

- increased numbers of vaccinated persons,
- different SARS-CoV-2 variants circulating at a given time,
- possible waning immunity, and
- changes in mitigation recommendations for the community.

Additional analyses are needed to fully understand breakthrough as a percentage of overall COVID-19 cases.



Washington State SARS-CoV-2 breakthrough cases by age group

January 17, 2021 - April 09, 2022

Age group (years)	Number of cases	Percent of cases
≤19	60,004	14%
20-34	122,617	29%
35-49	116,400	27%
50-64	80,541	19%
65-79	36,720	9%
80+	10,699	3%
Total	426,981	100%

- Age distribution of breakthrough cases has changed over time as more age groups became eligible for vaccine as shown below. Please refer to the [COVID-19 Vaccine Timeline](#) for details regarding vaccine eligibility and requirements in WA State.

Washington State SARS-CoV-2 breakthrough cases by sex

January 17, 2021 - April 09, 2022

Sex	Number of cases	Percent of cases
Female	229,258	54%
Male	188,548	44%
Unknown	9,175	2%
Total	426,981	100%

- A higher percentage of women in Washington State have chosen to get vaccinated than have men. Therefore, more women are at risk for vaccine breakthrough than men. This difference is reflected in the table above.

Washington State SARS-CoV-2 breakthrough cases by race and ethnicity

For all race and ethnicity reporting, all those who indicated Hispanic ethnicity are grouped in the Hispanic ethnicity, regardless of race. Racial groups are identified only for those who indicated non-Hispanic ethnicity. Based on this classification, our report includes the following groups:

- Hispanic; and
- non-Hispanic race categorizations for white, Black, Native Hawaiian and Pacific Islander, Asian, and American Indian/Alaska Native.

The multiracial group includes people who chose more than one category. This can include a selection of unknown and one other race category. This method of categorization allows us to assess the data by race and ethnicity. However, the reporting categories are incomplete and do not reflect the diversity of people and experiences across Washington state.

January 17, 2021 - April 09, 2022

Race and Ethnicity	Number of cases	Percent of cases
American Indian or Alaska Native*	1,357	0.3%
Asian*	8,927	2.1%
Black*	4,165	1.0%
Hispanic	14,391	3.4%
Multiracial*	2,912	0.7%
Native Hawaiian or Other Pacific Islander*	1,136	0.3%
Other Race*	1,207	0.3%
White*	68,676	16.1%
Unknown	324,210	75.9%
Total	426,981	100%

* Non-Hispanic

- Among 426,981 COVID-19 breakthrough cases, no race and/or ethnicity information was available for 324,210 (76%) people. This lack of data limits our ability to draw firm conclusions about the results provided in the table above.

Washington State SARS-CoV-2 breakthrough cases by symptoms and hospitalization

January 17, 2021 - April 09, 2022

	Symptomatic		Hospitalizations	
	Number of cases	Percent of cases	Number of cases	Percent of cases
Yes	76,322	18%	10,258	2%
No	38,300	9%	77,208	18%
No information or noted as unknown	312,359	73%	339,515	80%
Total	426,981	100%	426,981	100%

Note: Among the 426,981 COVID-19 breakthrough cases, no symptom information was available for 312,359 (73%), and no hospitalization information was available for 339,515 (80%) of the reported cases.

COVID-19 deaths among SARS-CoV-2 breakthrough cases in Washington State

January 17, 2021 - April 09, 2022

Among breakthrough cases from this surveillance period **2,081** have died of COVID-related illness.

The age range of deceased cases was 14 - 105 years (median 79 years).

Among the **2,081** deceased:

Underlying Conditions		
Yes	No	Unknown/Under investigation
1,100	15	966
Hospitalizations		
Yes	No	Unknown/Under investigation
1,402	323	356
Long-term Care Facility Association		
Yes	No/Unknown	
675	1,406	

Washington State SARS-CoV-2 vaccine breakthrough cases - variants

Vaccine breakthrough cases were prioritized for whole genome sequencing from January 17, 2021 through September 9, 2021 to ensure that the distribution of variants detected among breakthrough cases could be continually monitored. Beginning September 10, 2021, sequencing for breakthrough cases is now part of random sampling by sentinel surveillance laboratories across the state.

Please refer to the [SARS-CoV-2 Sequencing and Variants in Washington State](#) report for more details.

About this SARS-CoV-2 Vaccine Breakthrough Report

This report does not include information about:

- **Geography:** We want to protect individuals' privacy. Due to the small number of cases in some areas, it would be too easy to identify people with vaccine breakthrough.
- **Vaccine brand:** Vaccine breakthrough has been associated with all three current authorized vaccines. It is misleading to look at breakthrough cases by vaccine brand since we have received and administered more of some brands than others. These factors make it difficult to directly compare numbers of breakthrough cases among vaccine brands.